

## Features and Benefits

- The control circuit and the LED share the only power source.
- Control circuit and RGB chip are integrated in a package of 8mm round diameter LED components, form a complete control of pixel point.
- Built-in signal reshaping circuit, after wave reshaping to the next driver, ensure wave-form distortion not accumulate.
- Built-in electric reset circuit and power lost reset circuit.
- Each pixel of the three primary color can achieve 256 brightness display, completed 16777216 color full color display, and scan frequency not less than 2KHz.
- Cascading port transmission signal by single line.
- Any two point the distance not more than 3m transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade number are not less than 1024 points.
- Send data at speeds of 800Kbps.
- The color of the light is highly consistent, cost-effective.

## Applications

- Full-color module, Full color soft lights a lamp strip.
- LED decorative lighting, Indoor/outdoor LED video irregular screen.

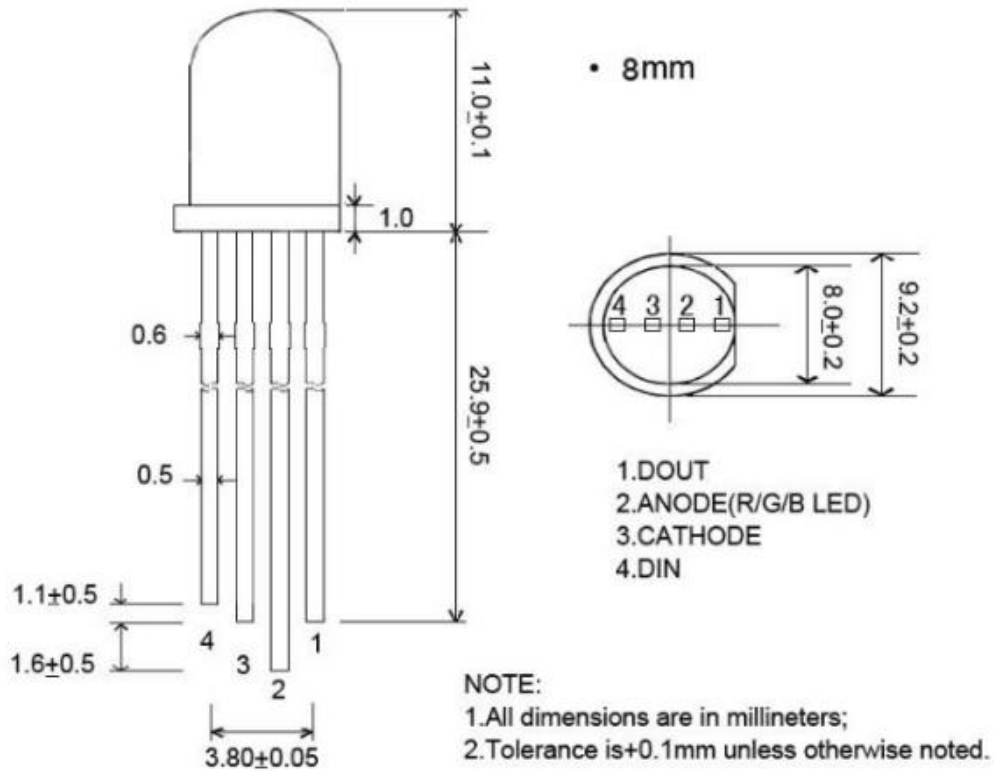
## General description

WS2812D-F8 is a intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 8mm diameter LED components. Its internal include intelligent digital port data latch and signal reshaping amplification drive circuit. Also include a precision internal oscillator and a 12V voltage programmable constant current control part, effectively ensuring the pixel point light color height consistent.

The data transfer protocol use single NZR communication mode. After the pixel power-on reset, the DIN port receive data from controller, the first pixel collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade pixel through the DO port. After transmission for each pixel, the signal to reduce 24bit. pixel adopt auto reshaping transmit technology, making the pixel cascade number is not limited the signal transmission, but only depends on the speed of signal transmission.

LED with low driving voltage, environmental protection and energy saving, high brightness, scattering angle is large, good consistency, low power, long life and other advantages. The control chip integrated in LED above becoming more simple circuit, small volume, convenient installation.

## Mechanical Dimensions & PIN Configuration



## PIN Function

NO.	Symbol	Function description
1	Dout	Control data signal output
2	VDD	Power supply LED
3	GND	Ground
4	Din	Control data signal input

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	V <sub>DD</sub>	+3.7~+5.3	V
Input voltage	V <sub>I</sub>	-0.5~V <sub>DD</sub> +0.5	V
Operation junction temperature	T <sub>opt</sub>	-25~+80	°C
Storage temperature range	T <sub>stg</sub>	-55~+150	°C

**Electrical Characteristics** ( $T_A=-20\sim+70^{\circ}\text{C}$ ,  $V_{DD}=4.5\sim 5.5\text{V}$ ,  $V_{SS}=0\text{V}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Tpy	Max	Unit
Low voltage Output Current	$I_{dout}$	$V_O=0.4\text{V}$ , Dout	14.5	15	15.5	mA
Input current	$I_I$	$V_I=V_{DD}/V_{SS}$	—	—	$\pm 1$	$\mu\text{A}$
Input voltage level	$V_{IH}$	D <sub>IN</sub> , SET	$0.7V_{DD}$	—	—	V
	$V_{IL}$	D <sub>IN</sub> , SET	—	—	$0.3 V_{DD}$	V
Hysteresis voltage	$V_H$	D <sub>IN</sub> , SET	—	0.35	—	V

**Switching Characteristics** ( $T_A=-20\sim+70^{\circ}\text{C}$ ,  $V_{DD}=4.5\sim 5.5\text{V}$ ,  $V_{SS}=0\text{V}$ , unless otherwise specified)

Parameter	Symbol	Condition	Min	Tpy	Max	Unit
Oscillation Frequency	$F_{osc}$	—	—	800	—	KHz
Transmission delay time	$t_{PLZ}$	CL=15pF, DIN→DOUT, RL=10KΩ	—	—	300	ns
Fall time	$t_{THZ}$	CL=300pF, OUTF/OUTG/OUTB	—	—	120	$\mu\text{s}$
Input capacity	CI	—	—	—	15	pF

## LED Characteristics

### ● RED

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	1.8	2.0	2.2	V	IF=20mA
Luminous Intensity	$I_v$	100	120	150	mcd	IF=20mA
Peak Emission Wavelength	$\lambda_p$	620	622.5	625	nm	—
Viewing Angle	$2\ 8_{1/2}$	—	—	—	deg	—

### ● GREEN

Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	3.0	3.2	3.4	V	IF=20mA
Luminous Intensity	$I_v$	400	450	600	mcd	IF=20mA
Peak Emission Wavelength	$\lambda_p$	520	522.5	525	nm	—
Viewing Angle	$2\ 8_{1/2}$	—	—	—	deg	—

● BLUE

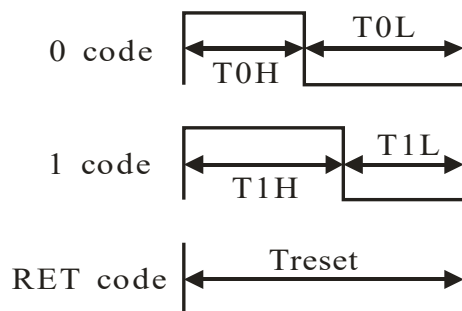
Parameter	Symbol	Min	Tpy	Max	Unit	Condition
Forward Voltage	$V_F$	3.0	3.2	3.4	V	IF=20mA
Luminous Intensity	$I_v$	80	90	100	mcd	IF=20mA
Peak Emission Wavelength	$\lambda_p$	465	467.5	470	nm	—
Viewing Angle	$2\ 8_{1/2}$	—	—	—	deg	—

**Data Transfer Time** ( $T_H+T_L=1.25\mu s\pm 600ns$ )

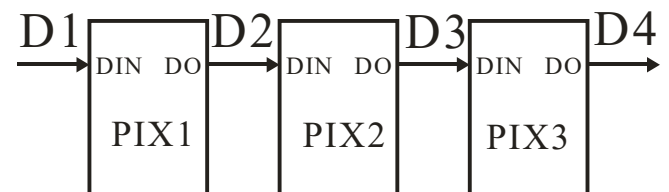
T0H	0 code, high voltage time	220ns~380ns
T1H	1 code, high voltage time	750ns~1us
T0L	0 code, low voltage time	750ns~1us
T1L	1 code, low voltage time	220ns~380ns
RES	low voltage time	>280μs

**Timing Sequence**

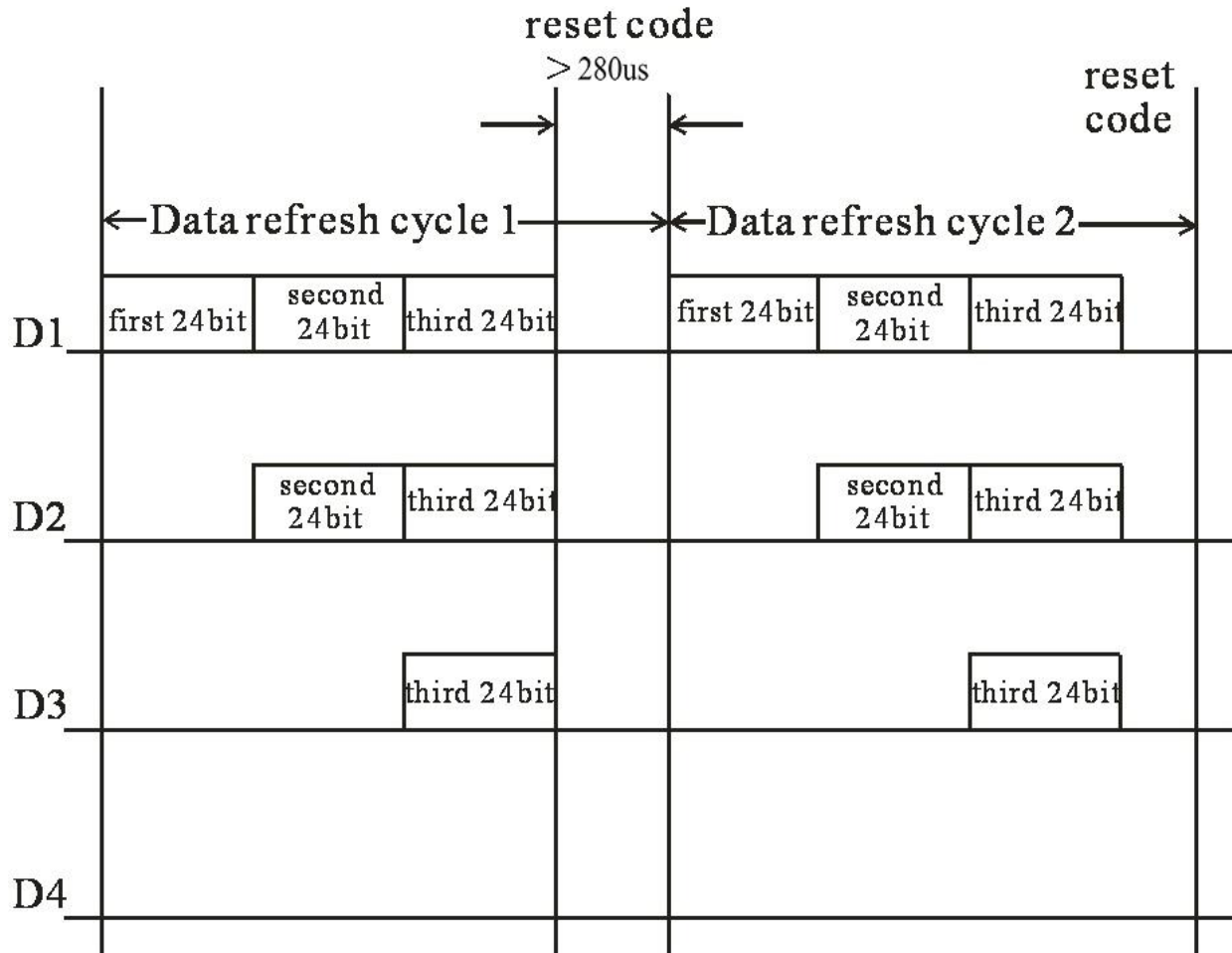
Sequence chart:



**Cascade method:**



## Data transmission method



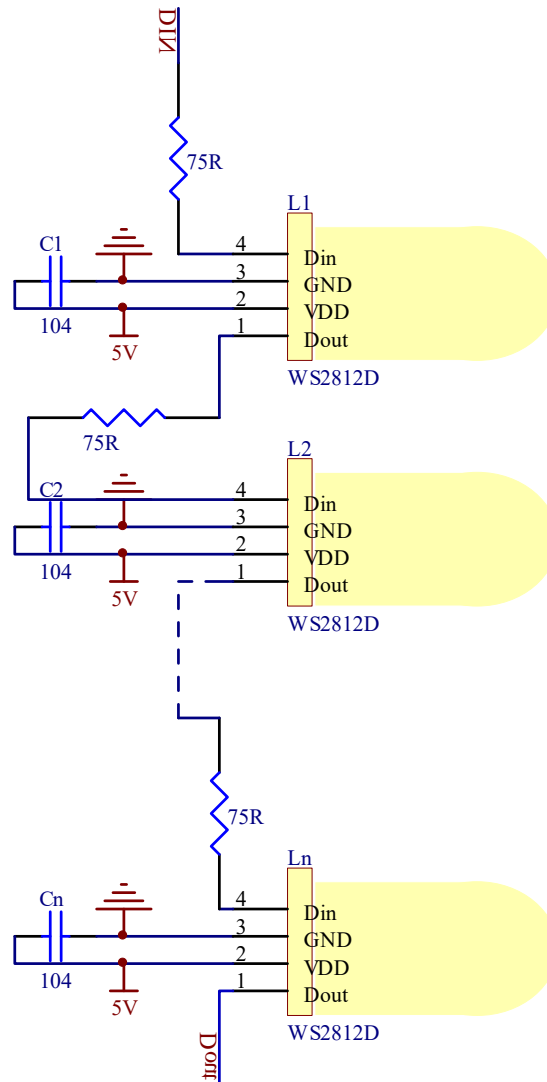
Note: The data of D1 is send by MCU, and D2, D3, D4 through pixel internal reshaping amplification to transmit.

### Composition of 24bit data

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0
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Note: Data transmit in order of GRB, high bit data at first.

## Typical application circuit



## Modify Records

Version №	Status Bar	Modify Content Summary	Date	Reviser	Approved
V1.0	N	New	20171109	Shen JinGuo	Yin HuaPing
V1.1	M	Timing	20180418	Shen JinGuo	Yin HuaPing

Remarks: Initial version: V1.0; Version number plus "0.1" after each revision;

Status bar: N--New, A--Add, M--Modify, D--Delete.